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(71) Applicant(s)

Welbeck UK Limited

(Incorporated in the United Kingdom)

**Reed Mill, Sheepbridge Lane, MANSFIELD,
Nottinghamshire, NG18 5DL, United Kingdom**

(72) Inventor(s)

John Thompson

(74) Agent and/or Address for Service

McNeight & Lawrence

**Regent House, Heaton Lane, STOCKPORT, Cheshire,
SK4 1BS, United Kingdom**

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(58) Field of Search

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(54) Knitted hose reinforcement fabric

(57) There is disclosed a hose reinforcement fabric comprising a knitted mesh (11) having a weft elongation substantially greater than its warp elongation. This enables a radially expanded end portion (31) to be formed for connection purposes. The fabric may be a two-bar raschel fabric using heat-resistant yarn. To form a hose a settable composition such as rubber is applied to both faces of the fabric so as to pass through the meshes. The use of a fabric in which the warp elongation is greater than the weft is also mentioned.

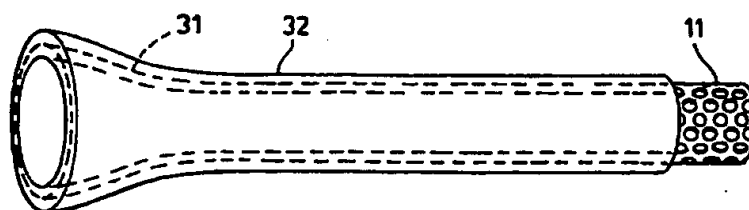


FIG. 3

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995

GB 2 312 002 A

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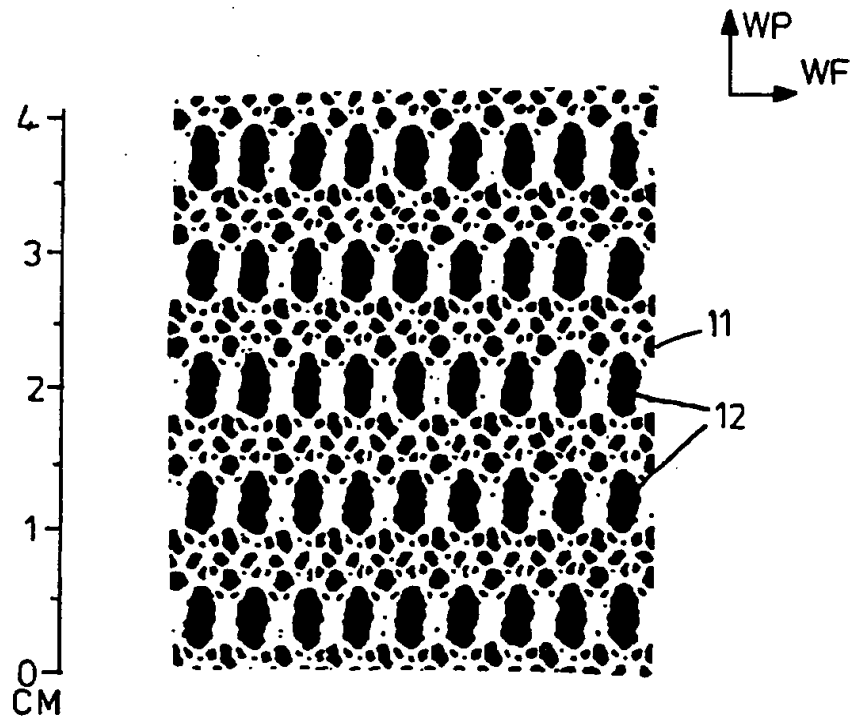


FIG. 1

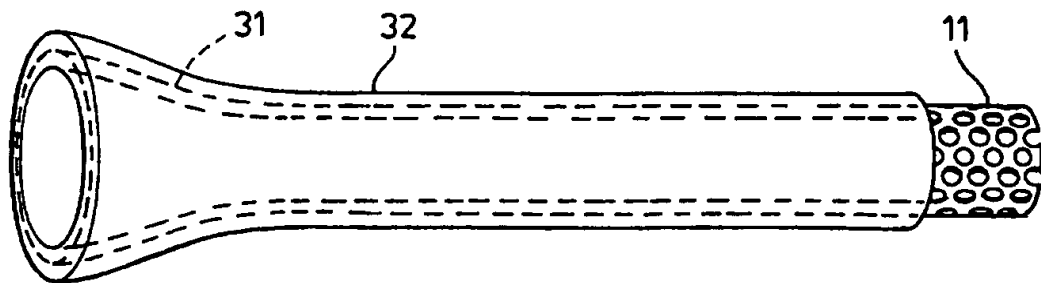


FIG. 3

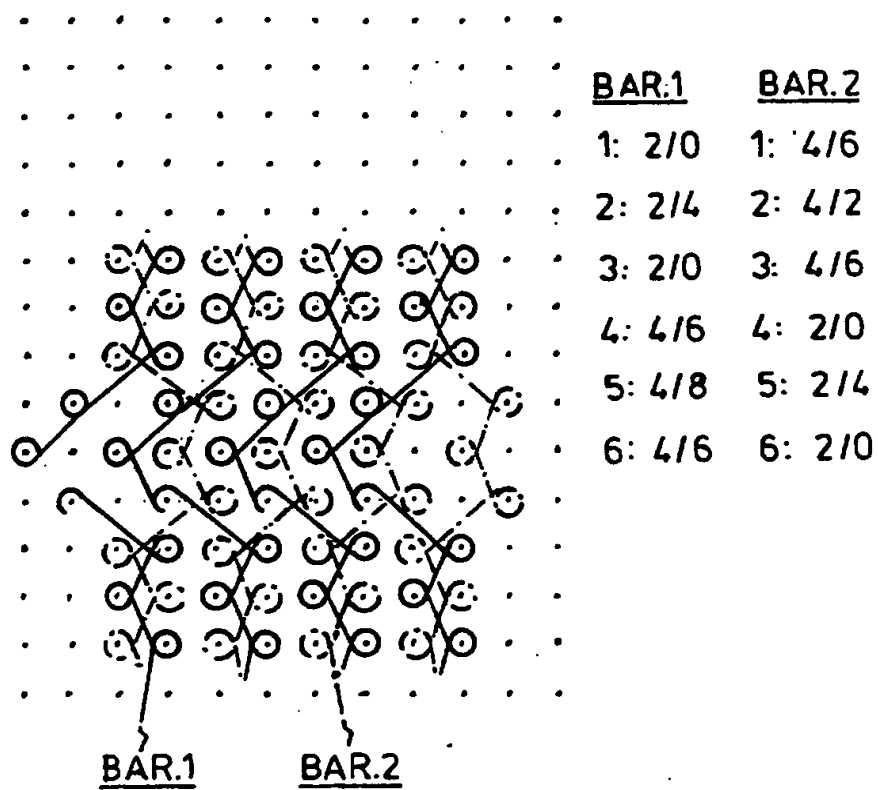


FIG.2

FABRIC

This invention relates to fabric, more particularly to hose reinforcement fabrics.

Hose reinforcement fabric is usually woven often in the form of woven mesh, or sometimes extruded in the form of a mesh, of low extensibility in both warp and weft directions. Such fabrics are not suitable for hoses for some applications where special measures are required for end connections.

The present invention provides a hose reinforcement fabric which, while being generally suitable for hoses of all descriptions is nevertheless adapted also for special end connection requirements.

The invention comprises a hose reinforcement fabric comprising a knitted mesh having a weft elongation substantially greater than its warp elongation.

The weft elongation may be at least three times the warp elongation and may be between 60% and 80%, more particularly between 75 and 80%.

The mesh apertures may be aligned in warp and weft directions. They may be spaced apart in the warp direction between 1.5 and 2 times their spacing in the weft direction, for example 1.9 times.

In a typical fabric, for use for example as turbo hose in automobiles, the mesh apertures may be spaced apart by 7.5 mm in the warp direction.

The mesh apertures may measure 2 mm in the weft direction, and may measure 4 mm in the warp direction.

The fabric may be a raschel fabric, and may be a 12 gauge fabric. It may be a two-bar fabric, knitted with half set threading on each bar. There may be two ends per guide on at least one bar.

The fabric may comprise heat resistant yarn, such as meta-aramid yarn, which may be of 40's metric count.

The fabric may have a resin finish, and may have, for some applications, a stiffness (which may be due to the resin finish) such that it can be formed into a tube of 25 mm radius without creasing. For the manufacture of hose, of course, the axis of the tube will usually be parallel to the warp direction.

The invention also comprises a hose comprising a reinforcing fabric as specified, and may comprise a settable composition, such as rubber, applied to inner and outer faces of a tube of the fabric which composition strikes through the mesh apertures from each face to make a firm bond.

The reinforcing fabric at at least one end may be expanded radially, perhaps into a bell-like shape, for connection purposes, and this may be done prior to application of the settable composition.

One embodiment of a hose reinforcing fabric and embodiments of hoses comprising the same according to the invention will now be described with reference to the accompanying drawings, in which:-

Figure 1 is an enlarged view of the fabric;

Figure 2 is a diagram showing lapping movements with lapping notation for 2 bar raschel knitting producing the fabric of Figure 1; and

Figure 3 is a diagrammatic view of a hose incorporating the fabric of Figure 1 as a reinforcement and having an expanded end for connection purposes.

The drawings illustrate a hose reinforcement fabric 11 comprising a knitted mesh having a weft elongation (in the WF direction, Figure 1) substantially greater than its warp elongation (in the WP direction, Figure 1).

For the illustrated fabric, the weft elongation is between 60% and 80%, and is in fact between 75 and 80%.

The mesh apertures 12 are aligned in warp and weft directions.

Figure 1 shows that the mesh apertures 12 are spaced apart 1.9 times more in the warp direction than in the weft direction - they could be spaced between 1.5 and 2 times, though other spacings are also possible.

From the scale on Figure 1 it can be seen that the mesh apertures 12 are spaced apart by 4 mm in the weft direction and by 7.5 mm in the warp direction, and that the apertures 12 measure 2 mm in the weft direction, 4 mm in the warp direction. Other sizes and spacings are of course possible.

The fabric 11 is a 12 gauge, 2 bar raschel fabric, with half set threading on each bar, two ends of 40's metric count meta-aramid yarn. The lapping diagram and pattern notation are set out in Figure 2.

The fabric is resin finished, a suitable formulation giving a required stiffness, being:

450 g/l	melamine formaldehyde resin (LYOFLX)(R.T.N.)
50 g/l	MGX catalyst
5 g/l	citric acid

The fabric is heat set at 190°C.

To make a hose, the fabric is cut into strips and bent into the form of a tube of suitable diameter - strips are typically 150 mm or 187 mm wide. The stiffness is such that the strips can be formed into a tube without creasing.

The rubber (or other settable composition) to form the hose is injected on to both inner and outer face of the fabric and strikes through the mesh apertures to make a firm bond with itself.

Figure 3 shows the formation of a bell-like enlargement 31 at one end of a hose 32 having the reinforcing fabric 11 opened out for such enlargement before injection of the rubber, the weft-wise extensibility allowing such enlargement. This is particularly useful in making secure end connections for the hose for high pressure applications such as turbo hose in automobiles.

Notwithstanding the weft-wise extensibility, the fabric 11 has sufficient rigidity and hoop strength in tubular form to be useful in place of conventional high pressure hose reinforcement, whether such enlargement for connection purposes is required or not.

The size, shape and configuration of the mesh structure, the material used as well as the finish can of course be adapted to suit any particular end use of the fabric which, though primarily conceived as a special purpose hose reinforcement fabric, will no doubt be suitable for many other end uses.

For some end uses, it may be possible to reverse the relative elongations so that the warp elongation is greater than the weft elongation - this could be useful for reinforcement for short lengths of hose where bell-like expansion is required, or generally where no such expansion is required at all.

CLAIMS

1. A hose reinforcement fabric comprising a knitted mesh having a weft elongation substantially greater than its warp elongation.
2. A fabric according to claim 1, in which the weft elongation is at least three times the warp elongation.
3. A fabric according to claim 1 or claim 2, in which the weft elongation is between 60 and 80%.
4. A fabric according to claim 3, in which the weft elongation is between 70 and 80%.
5. A fabric according to any one of claims 1 to 4, in which the mesh apertures are aligned in warp and weft directions.
6. A fabric according to claim 5, in which the mesh apertures are spaced apart in the warp direction between 1.5 and 2 times their spacing in the weft direction.
7. A fabric according to claim 6, in which the mesh apertures are spaced apart 1.9 times more in the warp direction than in the weft direction.
8. A fabric according to any of claims 1 to 7, in which the mesh apertures are spaced apart by 4 mm in the weft direction.
9. A fabric according to any one of claims 1 to 8, in which the mesh apertures are spaced apart by 7.5 mm in the warp direction.

10. A fabric according to any one of claims 1 to 9, in which the mesh apertures measure 2 mm in the weft direction.
11. A fabric according to any one of claims 1 to 10, in which the mesh apertures measure 4 mm in the warp direction.
12. A fabric according to any one of claims 1 to 11, being a raschel fabric.
13. A fabric according to claim 12, being a 12 gauge fabric.
14. A fabric according to claim 12 or 13, being a two-bar fabric.
15. A fabric according to claim 14, having half set threading on each bar.
16. A fabric according to claim 14 or claim 15, having two ends per guide on at least one bar.
17. A fabric according to any one of claims 1 to 16, comprising heat resistant yarn.
18. A fabric according to claim 17, comprising meta-aramid yarn.
19. A fabric according to any one of claims 1 to 18, comprising yarn of 40's metric count.
20. A fabric according to any one of claims 1 to 19, having a resin finish.
21. A fabric according to any one of claims 1 to 20, having a stiffness such that it can be formed into a tube of 25 mm radius without creasing.

22. A hose comprising a reinforcing fabric according to any one of claims 1 to 21.
23. A hose according to claim 22, comprising a settable composition applied to inner and outer faces of a tube of the fabric which composition strikes through the mesh apertures from each face to make a firm bond.
24. A hose according to claim 23, in which the composition is rubber.
25. A hose according to any one of claims 22 to 24, in which the reinforcing fabric at at least one end is expanded radially.
26. A hose according to claim 25, in which the reinforcing fabric is expanded into a bell-like shape.



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Claims searched: 1-26

Examiner: Alexander Littlejohn
Date of search: 29 August 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): D1K; F2P (PC11, PC25, PC26)

Int Cl (Ed.6): B29C; D04B; F16L

Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
Y	GB2199629A	(Dunlop) see whole document	22-24
X,Y	GB2102849A	(Milliken) see especially page 1 lines 27,28	X:1-5, 17-20 Y:22-24
X,Y	GB1577149	(ICI) see e.g. page 2 lines 22,23	X:1-5,12, 17,18,20 Y:22-24
X,Y	EP0238950A2	(Norddeutsche Faserweke) see especially Example 1 in column 3	X:1,5 Y:22-24
X	DE3627519A	(Overmans) see whole document, e.g. claim 2 and col 2 line 31	X:1,3-5, 17-20 Y:22-24
X,Y	US4857379	(Plontges) see e.g. column 2 lines 27-68	X:1-5,20 Y:22-24
Y	US3578028	(Roberts) see whole document	22-24

X Document indicating lack of novelty or inventive step
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A Document indicating technological background and/or state of the art.
P Document published on or after the declared priority date but before the filing date of this invention.

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